

# Practice Problems

Linear Algebra, Dave Bayer, February 12, 2011

These are supplemental practice problems for our first exam.

[1] Find a system of equations having as solution set the following affine subspace of  $\mathbb{R}^4$ .

$$\begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 0 \\ 0 \end{bmatrix} + s \begin{bmatrix} 3 \\ 4 \\ 1 \\ 0 \end{bmatrix} + t \begin{bmatrix} 5 \\ 6 \\ 0 \\ 1 \end{bmatrix}$$

[2] Find a system of equations having as solution set the following affine subspace of  $\mathbb{R}^4$ .

$$\begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} + t \begin{bmatrix} 4 \\ 3 \\ 2 \\ 1 \end{bmatrix}$$

[3] Find a system of equations having as solution set the following affine subspace of  $\mathbb{R}^4$ .

$$\begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} + s \begin{bmatrix} 1 \\ 1 \\ -1 \\ -1 \end{bmatrix} + t \begin{bmatrix} 1 \\ -1 \\ 1 \\ -1 \end{bmatrix}$$

[4] Find the intersection of the following two affine subspaces of  $\mathbb{R}^4$ .

$$\begin{bmatrix} 0 & 1 & 2 & 3 \\ 3 & 2 & 1 & 0 \end{bmatrix} \begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 6 \\ 6 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 \end{bmatrix} \begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 \\ 0 \end{bmatrix}$$

[5] Find the intersection of the following two affine subspaces of  $\mathbb{R}^4$ .

$$\begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 0 \\ 0 \\ 2 \end{bmatrix} + s \begin{bmatrix} -2 \\ 3 \\ 0 \\ -1 \end{bmatrix} + t \begin{bmatrix} -1 \\ 0 \\ 3 \\ -2 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 \end{bmatrix} \begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 \\ 0 \end{bmatrix}$$

[6] Find the intersection of the following two affine subspaces of  $\mathbb{R}^4$ .

$$\begin{bmatrix} 0 & 1 & 2 & 3 \\ 3 & 2 & 1 & 0 \end{bmatrix} \begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 6 \\ 6 \end{bmatrix}$$

$$\begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 2 \\ 0 \\ 0 \end{bmatrix} + s \begin{bmatrix} -1 \\ 0 \\ 1 \\ 0 \end{bmatrix} + t \begin{bmatrix} 0 \\ -1 \\ 0 \\ 1 \end{bmatrix}$$

[7] Find the intersection of the following two affine subspaces of  $\mathbb{R}^4$ .

$$\begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 0 \\ 0 \\ 2 \end{bmatrix} + s \begin{bmatrix} -2 \\ 3 \\ 0 \\ -1 \end{bmatrix} + t \begin{bmatrix} -1 \\ 0 \\ 3 \\ -2 \end{bmatrix}$$

$$\begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 2 \\ 0 \\ 0 \end{bmatrix} + s \begin{bmatrix} -1 \\ 0 \\ 1 \\ 0 \end{bmatrix} + t \begin{bmatrix} 0 \\ -1 \\ 0 \\ 1 \end{bmatrix}$$